

## CLAIMS

What is claimed is:

- 1 1. A method for mirroring data between a plurality of sites, comprising:  
2 establishing a replication relationship between the plurality of sites including a first  
3 site and a second site;  
4 replicating at least some changes made at any site of said plurality of sites at each  
5 other site of said plurality of sites;  
6 a first server associated with the first site requesting performance of a write operation;  
7 in response to said request, performing the write operation at the first site, and  
8 sending a message to request that the write operation be mirrored at the  
9 second site;  
10 the first server receiving an indication that the write operation could not be  
11 successfully performed at the second site;  
12 in response to the indication, the first server initiating a membership voting operation  
13 to determine which of the first server and a second server associated with the  
14 second site should be removed from said replication membership; and  
15 if it is determined that the second server associated with the second site should be  
16 removed from said replication membership, then the first server sending a  
17 message to indicate that write operations are no longer to be replicated at said  
18 second site.
- 1 2. The method of Claim 1, further comprising the steps of:  
2 the second site rejoining the replication relationship; and

3 in response to said second site rejoining the replication relationship, causing data  
4 associated with the second site to be resynchronized with data that resides at  
5 the first site, and remounting a database associated with the second site at the  
6 second site.

1 3. The method of Claim 1, further comprising the step of:  
2 if during the membership voting operation it is determined that the first site should be  
3 removed from said replication membership, then informing the second site  
4 that data is no longer to be replicated at the first site.

1 4. The method of Claim 3, wherein the step of informing comprises:  
2 at the second site informing a file server associated with the second site or the second  
3 server that data is no longer to be replicated at the first site.

1 5. The method of Claim 1, wherein the determination of which of the first server and the  
2 second server associated with the second site should be removed from said replication  
3 membership comprises determining which of the first server or the second server is  
4 more important or more reliable.

1 6. The method of Claim 1, further comprising the step of establishing a particular device  
2 as a quorum device, and wherein the step of initiating a membership voting operation  
3 comprises the steps of:  
4 notifying the quorum device that the write operation could not be successfully  
5 performed; and  
6 the quorum device determining which of the first server and a second server  
7 associated with the second site should be removed from said replication  
8 membership.

- 1     7.     The method of Claim 6, wherein the quorum device comprises a plurality of mirrored  
2           devices, and the step of notifying the quorum device is performed by a primary file  
3           server, wherein the primary file server is a file server, associated with one of the  
4           plurality of sites, through which all other files servers associated with other sites in  
5           the plurality of sites communicate with the quorum device.
- 1     8.     The method of Claim 1, wherein the indication that the write operation could not be  
2           successfully performed at the second site is an input/output error that is received at  
3           the first server.
- 1     9.     The method of Claim 1, further comprising the step of:  
2           if a particular site of the plurality of sites becomes inoperable, then initiating recovery  
3           of the particular site after it is determined that all messages transmitted from  
4           the particular site to each other site of the plurality of sites have been received  
5           at their destination.
- 1     10.    A machine-readable medium carrying one or more sequences of instructions for  
2           mirroring data between a plurality of sites, wherein execution of the one or more  
3           sequences of instructions by one or more processors causes the one or more  
4           processors to perform the steps of:  
5           establishing a replication relationship between the plurality of sites including a first  
6           site and a second site;  
7           replicating at least some changes made at any site of said plurality of sites at each  
8           other site of said plurality of sites;  
9           a first server associated with the first site requesting performance of a write operation;

10 in response to said request, performing the write operation at the first site, and  
11 sending a message to request that the write operation be mirrored at the  
12 second site;  
13 the first server receiving an indication that the write operation could not be  
14 successfully performed at the second site;  
15 in response to the indication, the first server initiating a membership voting operation  
16 to determine which of the first server and a second server associated with the  
17 second site should be removed from said replication membership; and  
18 if it is determined that the second server associated with the second site should be  
19 removed from said replication membership, then the first server sending a  
20 message to indicate that write operations are no longer to be replicated at said  
21 second site.

1 11. The machine-readable medium of Claim 10, wherein execution of the one or more  
2 sequences of instructions by the one or more processors causes the one or more  
3 processors to further perform the steps of:  
4 the second site rejoining the replication relationship; and  
5 in response to said second site rejoining the replication relationship, causing data  
6 associated with the second site to be resynchronized with data that resides at  
7 the first site, and remounting a database associated with the second site at the  
8 second site.

1 12. The machine-readable medium of Claim 10, wherein execution of the one or more  
2 sequences of instructions by the one or more processors causes the one or more  
3 processors to further perform the step of:

4 if during the membership voting operation it is determined that the first site should be  
5 removed from said replication membership, then informing the second site  
6 that data is no longer to be replicated at the first site.

1 13. The machine-readable medium of Claim 12, wherein the step of informing comprises:  
2 at the second site informing a file server associated with the second site or the second  
3 server that data is no longer to be replicated at the first site.

1 14. The machine-readable medium of Claim 10, wherein the determination of which of  
2 the first server and the second server associated with the second site should be  
3 removed from said replication membership comprises determining which of the first  
4 server or the second server is more important or more reliable.

1 15. The machine-readable medium of Claim 10, wherein execution of the one or more  
2 sequences of instructions by the one or more processors causes the one or more  
3 processors to further perform the step of:  
4 establishing a particular device as a quorum device, and  
5 wherein the step of initiating a membership voting operation comprises the steps of:  
6 notifying the quorum device that the write operation could not be successfully  
7 performed; and  
8 the quorum device determining which of the first server and a second server  
9 associated with the second site should be removed from said  
10 replication membership.

1 16. The machine-readable medium of Claim 15, wherein the quorum device comprises a  
2 plurality of mirrored devices, and the step of notifying the quorum device is  
3 performed by a primary file server, wherein the primary file server is a file server,

4 associated with one of the plurality of sites, through which all other files servers  
5 associated with other sites in the plurality of sites communicate with the quorum  
6 device.

1 17. The machine-readable medium of Claim 10, wherein the indication that the write  
2 operation could not be successfully performed at the second site is an input/output  
3 error that is received at the first server.

1 18. The machine-readable medium of Claim 10, wherein execution of the one or more  
2 sequences of instructions by the one or more processors causes the one or more  
3 processors to further perform the step of:  
4 if a particular site of the plurality of sites becomes inoperable, then initiating recovery  
5 of the particular site after it is determined that all messages transmitted from  
6 the particular site to each other site of the plurality of sites have been received  
7 at their destination.